Avian Predation on Butterflies — Again

By Dr. A. M. Shapiro*

A few decades ago the theory of mimicry was ostensibly discredited by negative evidence: birds "did not eat" butterflies. A bit later the notion that industrial melanism was a consequence of selective predation was pooh-poohed: birds "did not eat" moths at rest. Still more recently the passage of plant poisons through food chains was ridiculed because birds *did* eat "unpalatable" butterflies. Bird predation on butterflies is a volatile subject with great Darwinian import, and interest in it goes in seeming cycles. Most recently Muyshondt and Muyshondt (1976, *Ent. Rec.*, **88**: 283-285) have revived the issue, asserting that in long field experience in the Neotropics they have seen only two bird attacks on flying butterflies. This observation, however at variance with prevailing dogma — or precisely because it is — deserves serious consideration; all the more since it comes from low latitudes, where both predation and its evolutionary sequelae are said to be mostly highly developed.

It is *not* an adequate defence of the reality of avian predation to assert that mimicry is inexplicable without it. This is the sort of "proof" adduced for the existence of phlogiston or, later, the ether. On the other hand, negative evidence is proverbially rickety. A few personal observations bear on this. I spend more time afield than most people, some 200 days a year, and I see perhaps five such attacks a year on the average. They are infrequent enough in my purview that I note them carefully, and I am inclined to agree with the Muyshondts that by and large flying butterflies are rarely pursued in the air. Moreover, most such pursuits are unsuccessful.

My own experience with mass migrants (mainly *Nymphalis californica* and *Vanessa cardui*) also matches the Muyshondts': despite vast abundance, predation seems to be almost nil. The migrant case departs from the usual in that the animals can often be had with little or no effort and are also unusually valuable nutritionally, being full of yellow fat. Migratory Nymphalids are presumably edible, being cryptically coloured. They are as a rule an unpredictable resource, but why have we no records of birds (which are otherwise such good opportunists) making use of them when they are available — unless, as the Muyshondts suggest, they are simply not recognised as food items?

Despite these circumstances, avian predation is definitely important to butterflies. The data on beak-mark frequencies, which the Muyshondts treat rather summarily, bear witness to this. In 1974 I published some statistics on beak-mark frequency in monthly samples of common multivoltine butterflies in lowland central California (*American Naturalist*, **108**: 229-232). These were based on 19,787 specimens of four species

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collected in 1972; 1,044 of these were beak-marked, or 5.3%; for individual monthly samples the percentage beak-marked varied from 1% to 17%, and there was a clear pattern of higher frequency in March-April (before bird breeding season) and October-November (well after). I interpreted these data as meaning that butterflies were attacked by birds more frequently at those times of the year when they were relatively common and more preferred classes of prey, e.g. grasshoppers, were proportionately scarce. Note that a beak-marked butterfly represents an *unsuccessful* predation, for whatever reason; thus it could be that the lower incidence of beak-marked specimens in summer means more successful predation, though that seems unlikely (unless butterflies are less palatable, hence more likely to be rejected after being taken, in cold seasons). This temperate-zone muddle is confusing enough; whether anything like it occurs in the less seasonal tropis, I have no idea. Most of the beak marks in this study were, as the Muyshondts note, symmetrical — indicating that the animal was taken while at rest, with the wings over the back. Such attacks are readily observed on Clouded Yellows (*Colias*) in lucerne fields. They are probably the most common attacks on butterflies. Few birds (fly-catchers, swallows) make a living by taking small insects in mid-air, and they are only able to do so because they take them at a high enough rate to compensate for the high energetic cost. Such birds do not as a rule seem to prey on butterflies.

In summary, then, our present knowledge justifies the assumption that avian predation on mid-latitude butterflies in flight is infrequent, and the same may be true in low latitudes. Predation on resting butterflies is another story. In those species which differ in their dorsal and ventral coloration, the latter is always the cryptic surface. It may be no accident that species involved in mimicry associations differ hardly, if at all, between the two surfaces!

We are just beginning to learn about the adaptive significance of the roosting behaviour of butterflies at night and in bad weather. One of the functions of gregarious roosting, which occurs in many Neotropical taxa, may be to minimise predation. The migratory Monarch (*Danaus plexippus*) forms large overwintering aggregations, and predation is known to occur from them. Such aggregations bring together individuals of greatly differing palatabilities and increase the likelihood of exposing all the resident predators to emetic exerperiences. We do have a record (C. M. Fadem, in press) of a very small peripheral winter roost virtually eradicated, apparently by a single Mockingbird (*Mimus polyglottos*); the butterflies are believed to have been of low emetic potency.

Here in California many small vacant-lot butterflies spend the night at the tips of flimsy weeds which will not bear a bird's weight and which extend above a bird's reach from the ground. In this position they are seemingly immune from attack when the birds are foraging around dawn, when the dew has not yet evaporated and the air is still too cold for

butterflies to fly. Losses from such positions are virtually non-existent. If the butterflies are removed with forceps shortly before dawn and set on the bare ground below the weeds, nearly all have been eaten within an hour after sunrise. (If they are removed at dusk and set on the ground, most are gone before morning — the mice or shrews have got them.) There is certainly much more to avian predation on butterflies than attacks in mid-air!

A Week in Weymouth in July 1977. — I spent a week in the Weymouth area from 16th to 23rd July, 1977 hoping in particular to renew my acquaintance with the Lulworth Skipper (*Thymelicus acteon* Rott.), and also to explore the immediate vicinity of the town (including Portland Bill) and the coastal paths in both directions.

The weather was generally good with reasonable spells of sunshine, though rather windy at times, and I recorded the following species of butterfly in order of declining abundance with the last four each contributing only one sighting: — *Melanargia galathea* L., *Maniola jurtina* L., *Pyronia tithonus* L., *Thymelicus sylvestris* Poda, *Ochlodes venata* B. & G., *Aglais urticae* L., *Coenonympha pamphilus* L., *Pieris brassicae* L., *Pieris rapae* L., *Pieris napi* L., *Polyommatus icarus* Rott., *Pararge aegeria,* L., *Thymelicus acteon* Rott., *Aphantopus hyperanthus* L., *Polygonia c-album* L., *Vanessa atalanta* L. and *Vanessa cardui* L.

It was a pleasant surprise (certainly for an observer from Stafford) to note the profusion of *galathea.* My main quarry, *acteon,* was present in small numbers at a locality west of Lulworth Cove, whilst the most surprising omission during the week was surely *phlaeas.* A particularly productive area was a long bank of brambles, grasses and various flora just north-east of Ferrybridge. This locality held good numbers of *galathea, jurtina, tithonus, sylvestris* and *venata,* and was the only area where *icarus* and *hyperanthus* were recorded. Several small skippers at this site had dark brown tips to the undersides of the antennae, which I assume were atypical *sylvestris* or *lineola* and I should be interested to hear if any other observers have seen the latter species in the Weymouth area. Incidentally, this bank was the classic habitat for the Great Green Bush Cricket (*Tettigonia viridissima*) and a rather cursory search revealed five or six of these insects.

The rough, sloping meadows west of Osmington Mills were excellent for *galathea* and *jurtina,* whilst the only *cardui* of the week was imbibing at wild privet near Redcliff Point. The only moths recorded were the day-flying *Callimorpha jacobaeae* L., *Zygaena filipendulae* L., *Plusia gamma* L., *Otholitha chenopodiata* L. and, at Radipole Lake, a single *Ourapteryx sambucaria* L. — G. Summers, 23 West Close, Stafford, ST16 3TG.